

CHAPTER 9

IRRIGATION SYSTEMS

CHAPTER 9
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CHAPTER 9

IRRIGATION SYSTEMS

9.0 IRRIGATION SYSTEMS

9.1 GENERAL

- 9.1.1 Irrigation systems within the Town of Bennett shall comply with the Uniform Planning Code and the Electrical Code.
- 9.1.2 Any deviation in taps from the approved construction plans must be approved by the Town.
- 9.1.3 Any deviation in layout of the irrigation system from the approved construction plans shall be reviewed and approved by the Town Engineer or Director of Public Works, prior to installation.
- 9.1.4 Design: System is to be designed to provide full coverage and matched precipitation rates. Lateral piping shall be sized based on flow demands; velocities shall not exceed 5.5' per second. Principles of Xeriscape shall be utilized in the design on irrigation system. Some design considerations will include: Shrub and perennial beds are to be zoned separately from turf areas; sloped areas to have separate zoning for heads at the higher elevations from those at the lower elevation; and areas with different exposures to be zoned separately. Check valves-in-head are to be used for all areas adjacent to walkways and at the bottom of berms and pond areas.

9.2 MATERIALS

- 9.2.1 Taps: Contractor is responsible for supplying the PVC pipe saddles.
- 9.2.2 Back-Flow Prevention Device, Water Meter and Flow Meter: Back-flow device and Water Meter per the Town Standards in Chapter 7 of this Manual.

- 9.2.3 Copper: Type K rigid, conforming to ASTM Standard B88.
- 9.2.4 Mainline: Class 200 PVC, NSF approved.
1) 2 ½" or larger J.M. Ringtite pipe.
- 9.2.5 Laterals:
- 1) 2" or larger: Class 200 PVC, NSF approved.
 - 2) 1½" or 1": Class 200 PVC, NSF approved.
 - 3) No laterals smaller than 1".
 - 4) Trickle tubing shall be weather and UV resistant material.
 - 5) Polyethylene Drip Pipe: NSF approved, SDR pressure rated pipe, only as approved for drip applications.
- 9.2.6 Pipe Fittings: Pipe fittings shall be molded fittings manufactured of the same material as the pipe.
- 1) Funny Pipe (pop-up heads only): To be compatible to the elbows needed for the sprinkler heads.
 - 2) PVC: Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784.
 - 3) Wrought copper or cast bronze fittings, soldered or threaded, per installation details for all copper pipe.
- 9.2.7 Sleeving: Ductile Iron Pipe or PVC under all paved surfaces.
- 1) Sized to be a minimum of two sizes larger than the pipe being sleeved. Minimum 4" diameter, or larger where appropriate, for irrigation lines.
 - 2) Wires to be in separate sleeve from pipe, 2" minimum size pipe for control wire sleeves.
 - 3) Shall have marker tape on upper side and both ends for future locates.
- 9.2.8 Valves:
- 1) Remote Control Zone Valves: Remote Control Zone Valves shall be electrically-

operated, appropriate for the water supply, with manual bleed device and flow control stem. They shall have a slow-opening and slow-closing action for protection against surge pressure. Brand and model shall be Rain bird PE Series Remote Control Valves, scrubber option with self-cleaning screen, unless Town specifies other brand and model.

- 2) Isolation Gate Valves: Kennedy 1571X or approved equal, able to withstand a continuous operating pressure of 150 psi. Clear waterway equal to full diameter of pipe. Shall be opened by turning square nut to the left, (wheel opening is unacceptable).
- 3) Manual Drain Valve: 3/4" ball valve with tee handle. Watts, #B-6000, or approved equivalent.
- 4) Quick Coupling Valves: 1" brass Rainbird 44RC units with rubber cover. Keyes Rainbird 44 R 1" brass key.

9.2.9 Valve Boxes: House valves in valve box, with matching locking cover: Carson, Ametek, or approved equal. Only one valve per box. Install in box sizes as specified.

9.2.10 Control System:

- 1) Controller: Titrol Dial B Series controller, or approved equal. Number of stations shall include two extra stations for possible future use. Controller box shall be weathertight and vandal-resistant, with locking exterior disconnect.
- 2) In the future, and at the discretion of the Director of Public Works or Town Engineer, a Remote Control type system may be established, preferably as part of the Central Control System, outlined in Chapter 14 of this Manual. An acceptable system currently being used is the "Satellite Control Field Unit". The basic specifications for this unit are as follows:

- a) Satellite Control Field Unit (one per water tap): Bucklier COPS Universal Ultima, truliked radio field unit, (with data retrieval), ULF-24T and/or ULLE-36T. Basic capabilities: 100% solid-state electrical components, with surge protection, 24 VAC transformer rated at minimum of 10 watts, battery backup of at least 14 days, manual activation of remote control valves from the satellite, a minimum size as shown on the drawings and capable of basic, stand-alone operation, even when the satellite is not connected to communicating with the central unit, (by use of Irritrol controller).
- b) Miscellaneous Materials or Field Unit): (1) E.F. Johnson Clear channel LTR 8600 Mobile Sending Unit (#242-8600-001); (1) Astron RE-10A Regulated Power Supply; (1) mounting bracket for L'IR 8600 Sending unit; (1) Eicon pigtail for each 12 stations; (1) E.F. Johnson 10 foot length of Universal Cable (#023-4144-410); (1) Buckner 800 Mhz Dome Antenna.
- 3) Control System Enclosure: HoITH- Model A242408LP with A-24P24 steel panel, Model A-FK1208 floor stand kit and AL-2BR lock kit, or approved equal.
- 4) Surge Protection: 8' copper grounding rod, #4 solid copper wire, grounding buss receptacle, ground terminal strip and Irritrol SPD-587 surge protector per details.

9.2.11 Electric Control Wiring: #14 solid copper direct burial UF or PE cable, UL approved, or larger, per system design and Manufacturer's recommendations.

- 1) Five wires with consistent color scheme throughout:
 - Red = live
 - White = ground
 - Black, blue and green = extra

- 2) Wire connectors and waterproofing sealant to be used to join control wires to remote control valves.

9.2.12 Sprinkler Heads:

All heads shall be of the same manufacturer, as specified on the plans, and marked with the manufacturer's name and model in such a way that materials can be identified without removal from the system. The Town will specify brand and models to match other public system used in the vicinity.

- 1) Gear-Driven Rotor Heads: Hunter, Rainbird, or approved equal.
- 2) Pop-Up Spray Heads: Rainbird, or approved equal.

9.3 INSPECTION

9.3.1 Locate all utilities prior to trenching and protect from damage.

9.3.2 Inspect tap or other existing irrigation system, as applicable, prior to work.

9.4 EXECUTION

9.4.1 Water Service Connections (Taps): Contact Town 48 hours prior, to schedule work for inspections. Tap Fee Waiver requests need to be submitted to the Public Works Department, and approved, prior to tapping. Larger devices and meters are not always kept in stock and may have ordering stocking delays.

- 1) Contractor is responsible for excavation, connection to the corporation stop at the water main, providing the saddle for the PVC or A.C. pipe, making the connection to the existing water service, backfill and compaction, and pavement/shoulder/surface treatment replacement as needed. All items in paragraph 7.2.3 pertain, including requirement that no soldered joints or fittings are allowed on water service lines where buried. Soldered joints or fittings are permissible above grade or inside a vault. No solder, sealants, fluxes, pipe dope, and other

- materials shall contain any lead. The Town will make the actual tap on the line, if the tap is 2" in size or less. Larger taps must be made by the contractor; all taps and installations are subject to approval and inspection by the Public Works Department. All back-flow devices require payment at the time of delivery, unless prior arrangements have been made.
- 2) Install meter, back-flow, flow meter and drain valves, as specified within Chapter 7 of this Manual. Inspection of service line, (where appropriate), vault, water meter and back-flow is to be coordinated with the Director of Public Works.
 - 3) Install winterization assembly downstream of meter vault on copper, (with no size reduction), for mainlines greater than 2". Install winterization assembly on PVC, (no size reduction), for mainlines 2" or less.
 - 4) Copper pipe to be soldered, so that a continuous bead shows around the joint circumference. Insert a dielectric union wherever a copper-based metal, (copper, brass, bronze), and an iron-based metal, (iron, galvanized steel, stainless steel), are joined.

9.4.2 Pipe Trenching:

- 1) Install pipe in open-cut trenches of sufficient width to facilitate through tamping/puddling of suitable backfill material under and over pipe.

9.4.3 Sleeving: Boring shall not be permitted, unless obstruction in pipe path cannot be moved, or pipe cannot be re-routed.

- 1) Mains installed in existing sleeves at greater depth than adjacent pipe, shall have a manual drain valve at each end, if the sleeve is longer than 20', or at one end, if the sleeve is less than 20'.
- 2) Install sleeve so ends extend past edge of curb, gutter, sidewalk, bikepath or other obstruction, a minimum of 2'.

- 3) Mark all sleeves with an "x" chiseled in walk (or other verify) directly over sleeve location.
- 4) Shall be laid to drain at a minimum grade of 5"/100'.
- 5) Shall be bedded in 2" of fill sand and covered by 6" of fill sand.
- 6) Sleeves installed for future use shall be capped at both ends.
- 7) Separate Sleeve (2" minimum size) shall be used for all wiring.
- 8) Sleeving shall not have joints unless necessary due to length of sleeving run. If joints are necessary, only solvent-welded joints are allowed.
- 9) Compaction of backfill for sleeves shall be 95% of Standard Proctor Density ASTM D698-78. Use of water puddling around sleeves for compaction will not be allowed.

9.4.4 Pipe Installation:

- 1) Use Teflon tape on all threaded joints; only schedule 80 pipe may be threaded.
- 2) Reducing pipe size shall be with reduced insert couplings at least 6" beyond last tee of the larger pipe.
- 3) Snake PVC lateral pipe from side to side within the trench.
- 4) Cut pipe ends square and debur. Clean pipe ends before using primer and solvent cement. Join in manner recommended by manufacturer and in accordance with accepted industry practices. Cure for 30 minutes before handling, and 24 hours before allowing water in the pipe.
- 5) Backfill only after the hydrostatic pressure test inspection is complete. Backfill shall be free from rubbish, stones larger than 2' diameter, frozen material and vegetative matter. Do not backfill in freezing weather. If backfill material is rocky, the pipe shall be bedded in 2" of fill sand covered by 6" of fill sand.
- 6) After puddling or tamping, leave all trenches slightly mounded to allow for settling.

- 7) Compact to proper densities, depending on whether surface area over the line will be paved or landscaped.

9.4.5 Thrustblocks:

- 1) Shall be installed where PVC mainline (2½" or larger) changes direction over 20 degrees.
- 2) They shall be a minimum of one cubic foot of concrete.
- 3) Keep pipe joint clean of concrete. Do not encase.
- 4) Place wiring away from the thrust block to avoid contact with concrete.

9.4.6 Valve Installation: Install at least 12" from, and align with, adjacent walls or paved edges:

- 1) Automatic Remote Valves: Install in such a way that valves are accessible for repairs. Make electrical connection to allow a pigtail so the solenoid can be removed from the valve with 24" (minimum) slack thereby allowing ends to be pulled 12" above ground.
 - a) Flush completely before installing valve. Thoroughly flush the piping system, under full head of water for three minutes through the furthest valve before installing the new valve.
 - b) The Valve assembly should include ball valve and union, per detail, for ease of maintenance and repair.
 - c) Install in a locking valve box per details.
- 2) Manual Drain Valve: Install per plan, but in no case less than at the low points of the system and at the end of the mainline. Install in 6" CL-200 PVC sleeve access with 10" locking valve box lid. Install valves on swing joint assembly per detail. Sump to be 4 cubic feet of crushed gravel over filter fabric.
- 3) Quick Coupler Valve: Install in 10" round locking valve box. Flush completely before installing valve. Thoroughly flush the

piping system, under full head of water for three minutes through furthest valve, before installing the new valve.

- 4) Isolation Gate Valves: Install in valve box.
- 5) Valve Boxes:
 - a) Brand all valve boxes with the following codes: "SV" and the controller valve number, per "As-Built" Record Drawings, for all remote control valves; "DV" for all drain valves; "GV" for all isolation valves; "DRGV" for all drip system isolation valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; and "MV" for all master valve assemblies. Use a branding iron stamp with 3" high letters.
 - b) The Valve box shall NOT rest on a line. The top of the valve box shall be flush with finished grade.
 - c) Install valves in a box that has adequate space to access valves with ease. Valves shall not be too deep to be inaccessible for repairs. Three inch depth of $\frac{3}{4}$ " washed gravel shall be placed in the bottom of each valve box with enough space to fully turn the valve for removal.

9.4.7 Head Installation:

- 1) Set heads plumb and level with finished grade. In sloped area, heads are to be tilted as necessary to provide a full radius spray pattern.
- 2) Finish the lateral lines before installing heads. Thoroughly flush the piping system, under full head of water, for three minutes, through furthest head, before installing new heads. Cap risers, if delay of head installation occurs. Install Pop-up heads along walks and bikeways: Bed heads in 6" layer of sand under the base of the head.

- 3) Nozzles: Supply appropriate nozzle for best performance.
- 4) Adjustment: Adjust nozzles and radius of throw to minimize overspray onto hard surfaces.

9.4.8 Electrical Connections:

- 1) New connections to be approved through the Public Works Department.

9.4.9 Controller Installation:

- 1) To be installed in an above ground location suitable to prevent vandalism and provide protection from adverse weather conditions, and per Town direction. All exposed wiring to and from the controller shall be encased in galvanized metal conduit. Exterior controllers to be installed on 6" thick concrete pad.
- 2) When required, install Controller and Satellite Control Units as per the Town's directions and in accordance with the manufacturer's specifications. Install surge protection, grounding rods and other accessory components as specified.
- 3) Attach wire markers to the ends of control wires inside the controller unit. Label wires with the identification number of the remote control valve activated by the wires.

9.4.10 Wiring:

- 1) Comply with Town Electrical Codes.
- 2) Power source brought to the controller through a ground fault receptacle installed within the controller casing. Clock shall be plugged into receptacle.
- 3) String control wires as close as possible to the mainline and consistently along, and slightly below, one side of the pipe.
- 4) Leave a minimum loop of 24" at each valve and controller and at each splice, at the ends of each sleeve, and 100' intervals along continuous runs of wiring, and change of direction of 90 degrees or more.

Band wires together at 10' intervals with pipe wrapping tape.

- 5) Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install three extra wires, as specified, to the furthest valve on the system, and/or each branch of the system.

9.5 TESTING

9.5.1 All tests shall be run in the presence of the Public Works Director. Schedule all tests a minimum of 48-hours' in advance. Repeat any failed tests until full acceptance is obtained.

- 1) Hydrostatic Test: Hydrostatically test the piping system in place before sleeving and back-filing. Maintain a normal working pressure for not less than four hours. Test is acceptable if no leakage or loss of pressure is evident during the test period.
 - a) At the conclusion of the pressure test, install heads, etc. after flushing system as outlined above.
- 2) Operative Test: Activate each remote control valve from the controller in the presence of the Public Works inspector. Replace, adjust or move heads and nozzles as needed to obtain an acceptable performance of the system. Replace defective valves, wiring or other appurtenances to correct operational deficiencies.
- 3) Central Control System Acceptance Test (if and when applicable): The Public Works inspector will activate each remote control valve from the Central Control System base station. If acceptance of the Central Control System is not obtained within 90 days following initial test, the Town of Bennett has the option of requesting replacement of equipment, or portions thereof, as needed to correct deficiencies.

9.6 COMPLETION OF SERVICES

9.6.1 When the project construction is complete, request from the Public Works Department inspection for Construction Acceptance:

- 1) Demonstrate the system to authorized Town personnel.
- 2) Provide Town personnel with ordering information, including model numbers, size and style for all components.
- 3) Provide two sets of "AS BUILT" drawings, showing system as installed with each sheet clearly marked "AS-BUILT DRAWINGS", the name of the project and all other pertaining information.
 - a) Provide one set of reproducible mylars, no larger than 24" x 36".
 - b) Provide one set of all sheets reduced to 11" x 17", with each station color coded, and each sheet plastic laminated.
- 4) Clean up: Remove all excess materials, tools, rubbish and debris from the site.

9.6.2 Warranty and Maintenance: Once Construction Acceptance is obtained, begin warranty and maintenance period by Contractor. Maintain irrigation system in optimal working condition for duration of period between Construction Acceptance and Final Acceptance (two years minimum). Make periodic adjustments to the system in order to achieve the most desirable application of water.

9.6.3 Final Acceptance: Request Final Acceptance inspection at least 30-days before the end of the two-year maintenance period, from the Director of Public Works. A 30-day project work-through will take place where authorized Town personnel will be on-site to operate and inspect the system. Schedule an operator's training session with the authorized Public Works personnel at the beginning of this work-through period.

- 1) Provide the Town's Public Works Department with operating keys, servicing tools, test equipment, warranties guarantees,

maintenance manuals, and Contractor's affidavit of release of liens. Keys, tools and other operating equipment need to be turned over to the Public Works Department prior to commencement of the work-through inspection. Submittal of all these items must be accompanied by a transmittal letter and delivered to the Public Works Department (delivery at the project site is not acceptable).

- 2) Problems identified during the project work-through will be coordinated with the Public Works Department and solutions executed by the Contractor. Contractor shall complete a punchlist of items requiring resolution prior to request for Final Acceptance.
- 3) Request Final Acceptance from Public Works. Once final acceptance is formally obtained, the Town will release any relevant securities, and begin maintenance.

9.7 GUARANTEE/WARRANTY AND REPLACEMENT

9.7.1 For the period following Construction Acceptance by the Town, all irrigation materials, equipment, workmanship and other appurtenances are to be guaranteed and warranted against defects for a period of 2 years. Settling of trenches or other depressions, damages to structures or landscaping caused by settling, and other defects are to be corrected by the Contractor at no cost to the Town. Make repairs within seven days of notification by the Town representative. The Guarantee/Warranty applies to all originally installed materials and equipment, and to replacements made during the guarantee/warranty period.

TOWN OF BENNETT
 PUBLIC WORKS DEPARTMENT
 Commercial/Residential Water Use Information Packet

PVB Application Drawings

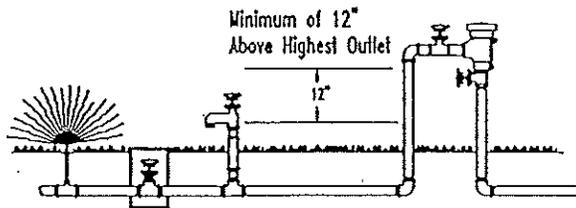


Figure 1.1

DOWNSTREAM SIDE OF VACUUM BREAKER MAY BE MAINTAINED UNDER PRESSURE BY A VALVE BUT THERE SHALL BE ABSOLUTELY NO POSSIBILITY OF IMPOSING BACK PRESSURE BY PUMP OR OTHER MEANS.

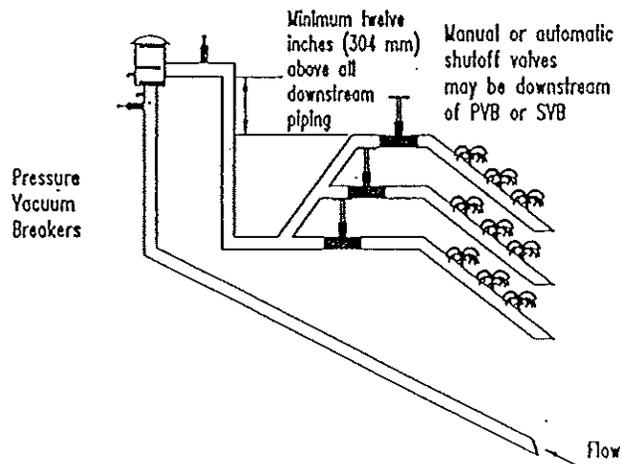
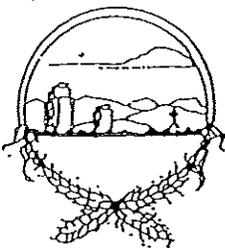


Figure 1.2



PRESSURE VACUUM BREAKERS

Town of Bennett

Issued: _____

Revised: _____

Drawing No.

PW-1

PRESSURE VACUUM BREAKERS

1 DESIGN

- A. Pressure vacuum breaker contains one or two independently operated, spring-loaded check valves and an independently operated, spring-loaded air-inlet valve located on the discharge side of the check valve.
- B. A pressure vacuum breaker has a test cock and shutoff valve at each end of the device. Test cock No. 1 will be on the inlet side and sense pressure between the isolation valve No. 1 and the internal check valve. Test cock No. 2 senses the pressure between the check valve and the air-inlet valve or poppet. Isolation valve No. 2 will be on the outlet side of the device. See Figure 1.5
- C. Pressure vacuum breakers are designed to prevent backsiphonage.

2. OPERATION

- A. The spring-loaded check valve opens during normal flow and closes under no-flow or reversed-flow conditions.
- B. When supply pressure drops below atmospheric pressure, air pressure opens the air-inlet, which breaks the vacuum. The check valve closes simultaneously preventing backsiphonage from occurring.
- C. The required 12" loop in the system prevents backflow from occurring.

INSTALLATION OF PRESSURE VACUUM BREAKERS

- 1. Pressure vacuum breaker assembly's use is based on degree of hazard and pressure conditions as determined by the utilities department.
- 2. Installed in situations where it will be under continuous supply pressure for long periods of time.
- 3. Installed in almost any installation that will not subject the device to backpressure regardless of the degree of hazard.
- 4. Are frequently installed in irrigation systems, saturators, and commercial dishwashing systems.
- 5. Can be tested and repaired without removing them from the system.

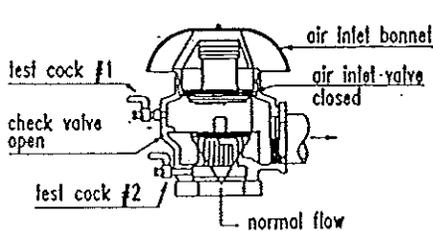


Figure 1.3 P.V.B. in normal flow

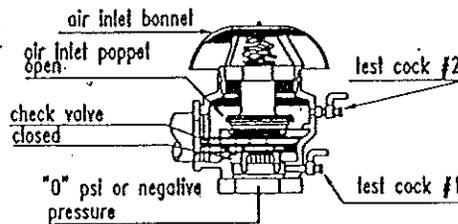
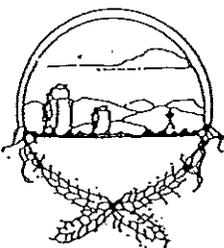


Figure 1.4 P.V.B. Under backsiphonage



PRESSURE VACUUM BREAKER-2

Town of Bennett

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Revised: _____

Drawing No.

PW-2

VACUUM BREAKERS

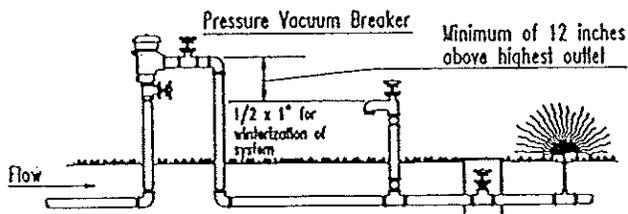
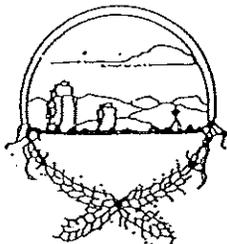


Figure 1.5 P.V.B on irrigation system

6. Pressure vacuum breakers typically come in sizes ranging from 1/2 inch through 2 inch. Figures 1.1 - 1.5 show the typical configuration for devices up through 2 inches.
7. Pressure type vacuum breakers cannot be used as a containment device.

NOTE: Pressure vacuum breakers may be used as a containment device only on irrigation systems where served by a separate service line and meets all other installation specifications.

8. Must be installed so that the critical level shall be no less than twelve inches above the highest point of use, or associated piping located downstream of the assembly.
9. General installation specification should require the device to be no more than five feet above the ground. This requirement has to do with the ease of testing and maintenance. The unit will operate properly at greater heights.
10. Shall not be used where back pressure is possible.
11. May be used under continuous pressure.
12. May be used for the isolation of any degree of hazard.
13. P.V.B.'s are recommended for outdoor use only, or where water spillage is of no concern.
14. Pressure vacuum breakers should be protected from freezing and vandalism. In protecting these units the air inlet must not be obstructed as this will defeat the usefulness of the devices.
15. Stop and waste valve or adequate drainage provisions shall be installed for winterization of irrigation systems.
16. All pressure vacuum breakers installed in the Town shall be on the most recent approved list published by USC FCCCHR.



VACUUM BREAKERS

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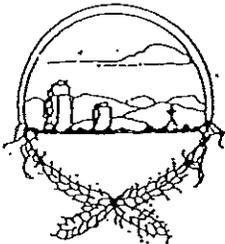
Drawing No.

PW-3

REDUCED PRESSURE ASSEMBLY

REDUCED PRESSURE ASSEMBLY INSTALLATION REQUIREMENTS

1. The reduced pressure assembly must not be installed in a place where it may be submerged under water.
 - A. There shall be no pit or vault installations unless there is a drain twice the diameter of the assembly to daylight. This could be a hillside vault where one side is open for drainage but would allow protection from freezing.
 - B. The "RP" shall not be installed in a vertical position unless there is specific approval from the Foundation for Cross-Connection Control and Hydraulic Research and the Town of Bennett for the particular make and model of device. As of this writing there is no such approval. Some manufacturers installation instruction indicate a vertical position is allowed. These should not be followed unless the above approval has been obtained from the Town of Bennett's Public Works Department.
2. Basement installation, although a form of pit, are allowed if the following conditions are met.
 - A. A drain large enough to allow the maximum flow of water the size of "RP" is capable of discharging under twice (2x) the normal static water pressure for the system to daylight.
 - B. Some type of high water alarm system installed to notify personnel of a problem occurring in the area.
AND/OR
 - C. No electrical components in the same general area of the assembly.
3. Only factory supplied funnels shall be used to remove the periodic discharge from the assembly and the piping system must have adequate air gap at the termination of the run.
4. Freezing weather and other climatic conditions must be taken into consideration when installing any back flow preventer outside of a protective enclosure.
5. Places of business that cannot be without a continuous supply of water must install a dual installation, that is two "RP" assemblies in parallel, on the main service line.
6. Reduced pressure back flow preventers installed on dead end lines will take some special care. Fire lines are an example of this type of installation. When the main line pressure fluctuates, there will be a discharge from the "RP" relief unit to stabilize the zone pressure, and if flow alarms are installed they may be activated. There are two ways to reduce this problem listed below:
 - A. A soft seated single check valve installed upstream or ahead of the "RP" unit will stop or reduce this problem without affecting the operation of the assembly.
 - B. A pressure regulating valve placed upstream or ahead of the "RP" assembly and set at a pressure of, or less than the lowest pressure drop that occurs.
 - C. Either of these options will create additional flow loss for the fire system and must be considered before actual installation is done.
 - D. This same method may be used on installations where great main line fluctuation becomes a nuisance on assemblies installed in buildings.



REDUCED PRESSURE ASSEMBLY

Town of Bennett

Issued: _____

Revised: _____

Drawing No.

PW-4

REDUCED PRESSURE ASSEMBLY

7. All assemblies installed within a confined area should maintain the minimum spacing listed below.
 - A. When the test cocks are facing the wall there should be a minimum of 24 inches (24") from the assembly and the wall.
 - B. When the test cocks are facing away from the wall there should be a minimum of twelve inches (12") from the nearest wall.
 - C. Adjacent and opposing walls must allow enough room for testing and maintenance. This is generally left to the discretion of the local authority but should be no less than three feet (3') of air space in front of, and above, the assembly.

NOTE: Contact the Town of Bennett's Public Works Department for their regulations and requirements for variances from the standard.

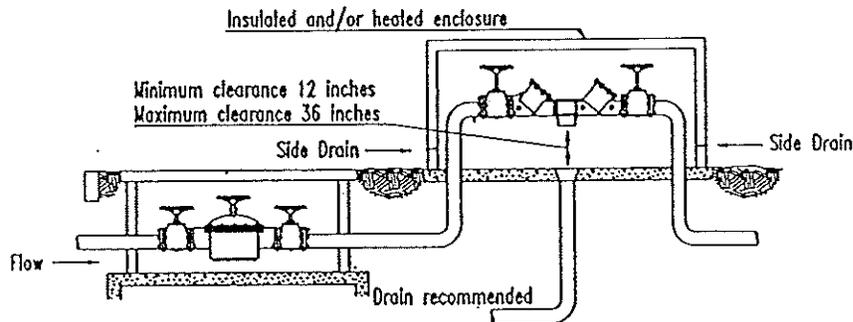


Figure 10.1 Outside protected installation

ILLUSTRATIONS OF APPROVED INSTALLATIONS

1. In reference to Figure 10.1, some drainage should be through the side of the enclosure. This will create a drain to daylight as required for this type of installation. Bottom drainage alone is not sufficient.
2. Reduced pressure assemblies installed within structures above ground must have an adequate drain and maintain the minimum of 12" from the floor. Owners and occupants should be notified and warned of the potential for large amounts of water being discharged from the relief valve. Any materials stored in this area could be damaged.

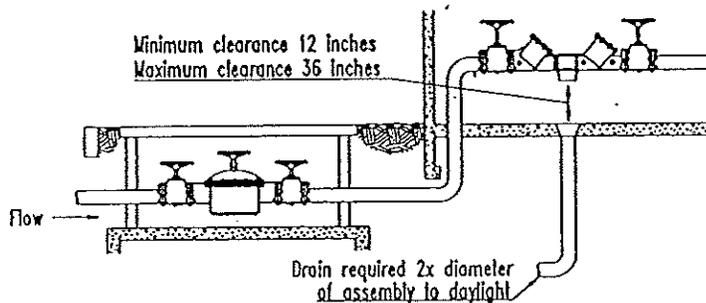
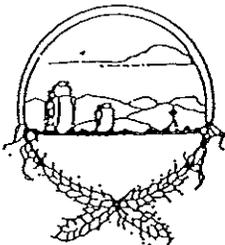


Figure 10.2 Building installation above ground



REDUCED PRESSURE ASSEMBLY

Town of Bennett

Issued: _____

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Drawing No. _____

PW-5

DOUBLE CHECK ASSEMBLY

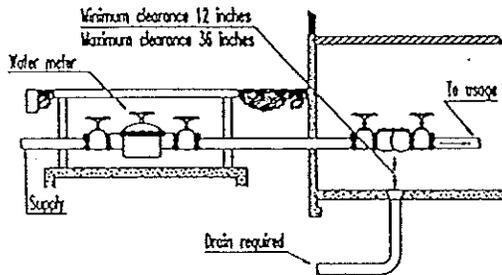


Figure 1.8 Basement installation

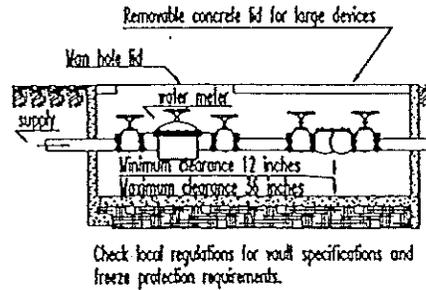
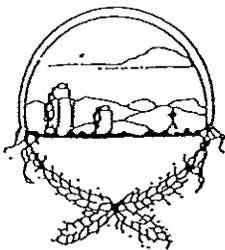


Figure 1.9 Pit or Vault installation

INSTALLATION OF DOUBLE CHECK ASSEMBLIES

1. A double check-valve assembly may be installed in a pit or above ground, so long as it is protected from freezing and vandalism.
 - A. Pit and other special locations require the approval of the Town of Bennett as to pit dimensions, drainage, etc.
2. Double check-valve assemblies must be installed in a horizontal position (unless approved by the Foundation for Cross-Connection and Hydraulic Research or Town of Bennett for vertical installation).
3. A double check-valve assembly should be installed where it is easily accessible for testing and maintenance.
4. Although double check-valve assemblies do not emit water as does the reduced pressure assembly or the pressure vacuum breaker, adequate drainage is required. During testing and repair large quantities of water may be released.
5. Figures 1.8 and 1.9 show typical installation with the recommended clearances for an approved installation.
6. All assemblies installed within a confined area should maintain the minimum spacing listed below.
7. When the test cocks are facing the wall there should be a minimum of 24 inches (24") from the assembly and the wall.
 - A. When the test cocks are facing away from the wall there should be a minimum of twelve inches (12") from the nearest wall.
 - B. Adjacent and opposing walls must allow enough room for testing and maintenance. This is generally left to the discretion of the local authority but should be no less than three feet (3') of air space in front of, and above the assembly.

NOTE: Contact the Town of Bennett's Public Works Department for their regulations and requirements for variances from the standard.



DOUBLE CHECK ASSEMBLY

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Drawing No.
PW-6

DOUBLE CHECK ASSEMBLY

1. A double-check valve assembly is a mechanical assembly consisting of two independently operated, spring loaded, soft sealed check valves, (4) properly located resilient seated test cocks and 2 resilient seat valves located on each end of the unit.
2. All double-check assemblies installed in Bennett shall be on the most recent approved list published by the Foundation for Cross-Connection Control and Hydraulic Research.

DOUBLE CHECK VALVES MUST NOT BE USED FOR THE PROTECTION OF IRRIGATION SYSTEMS.

3. Double-check valve assembly's use is based on degree of hazard and pressure conditions as determined by the utilities department review.

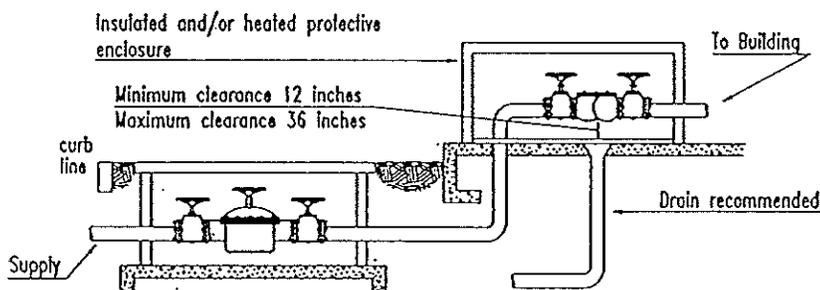


Figure 1.6 Above ground installation

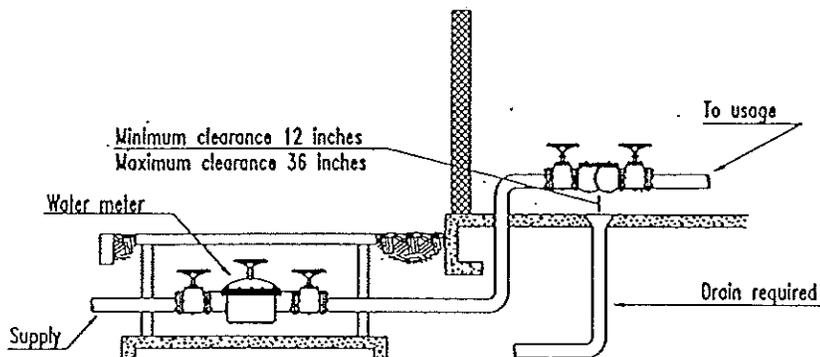
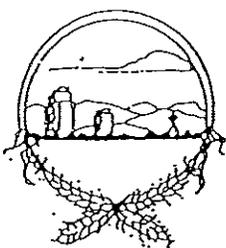


Figure 1.7 Building installation



DOUBLE CHECK ASSEMBLY

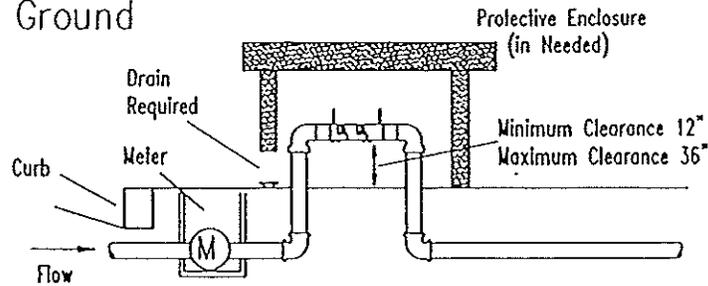
Town of Bennett

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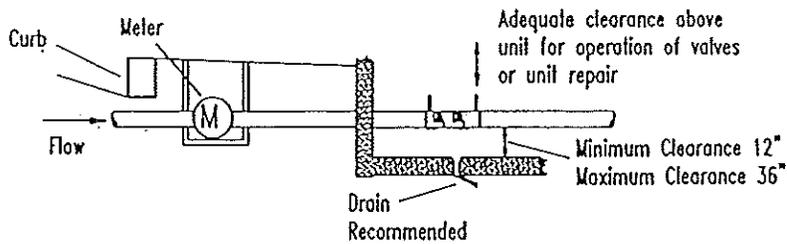
Revised: _____

Drawing No.
PW-7

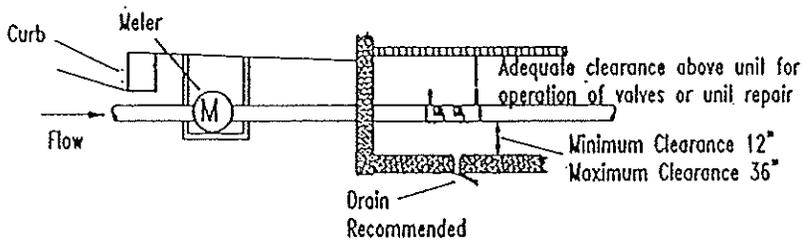
Above Ground



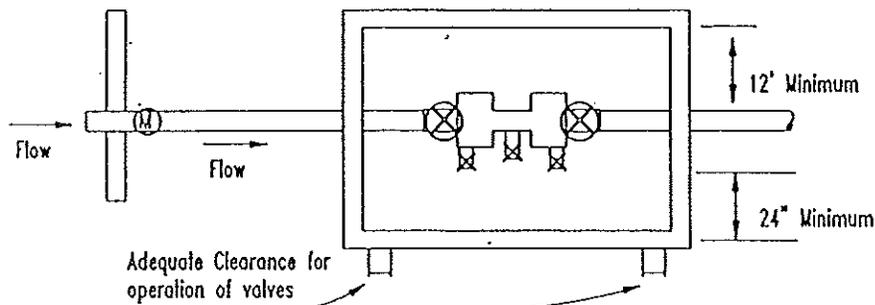
In Building



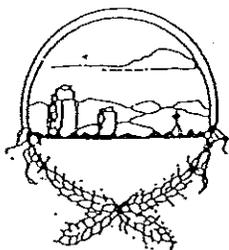
In Basement



Plan View



Typical Installations with Minimum Clearances
Double Check Valve Assemblies



DOUBLE CHECK VALVE-2

Town of Bennett

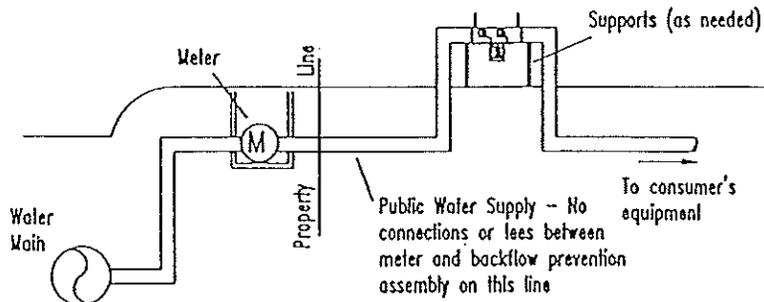
Issued: _____

Revised: _____

Drawing No. _____

PW-8

Backflow Prevention Assembly



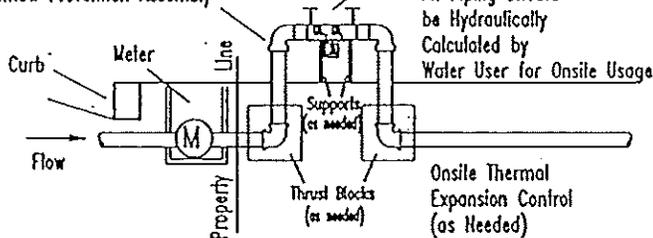
Note:
Place assembly 12" or more
above high water level
of surrounding ground.

Note:
Resilient sealed shut-off valves
and testcocks are required.

Service Connection Installation Guidelines

Assembly Shall Be Located as Close to the
Service Connection as Possible With No
Connections between the Water Meter and
the Backflow Prevention Assembly

Assembly Shall be
Horizontal and Level
Unless Approved for
Other Orientation(s)



Backflow Prevention Assemblies are to be used within
their rated operating conditions:

Pressure:

Backflow prevention assemblies typically have a maximum working pressures (MWWP) of 150 psi (1034 KPa) or 175 psi (1206 KPa). Assemblies are designed to operate continuously at this pressure, which is identified on the assembly.

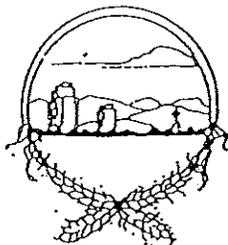
Temperature:

Backflow prevention assemblies are designed to operate continuously at their maximum working water temperature (MWWT), which is identified on the assembly.

Rate of Flow:

Backflow prevention assemblies are designed to operate continuously up to their rated flow (i.e., gallons per minute - GPM; or liters per second - L/s)

NOTE: All installations of backflow prevention assemblies must be in compliance with state and local plumbing and building codes.



BACKFLOW PREVENTING ASSEMBLY

Town of Bennett

Issued: _____

Revised: _____

Drawing No.
PW-9